

*How do I recognize evidence of geologic change in my environment?
What is the source of the Crissy Field riprap rocks?*

PILLOW BASALT

Off Point Bonita, Marin Headlands



Description

Basalts are only one type of volcanic rock, but they are the most common crust rock. Volcanic rocks are extruded above ground, resulting in very fine-grained textures. Basalts have a lower percentage of silica and a higher percentage of iron than other volcanic rocks and tend to be black in color. Underwater eruptions result in pillow lavas because of repeated oozing and quenching by cold water.

Pacific Ocean floor, eastern coast of Hawaii – pillow basalt forming



Riprap rock – this basalt contains gas bubbles and has been altered by hydrothermal activity to “greenstone.”



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SERPENTINITE

Baker Beach bluff



North Baker Beach



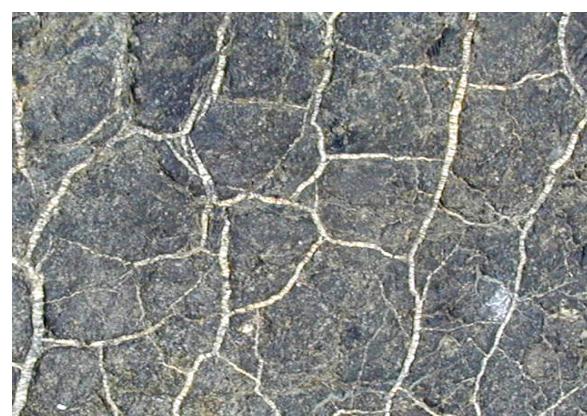
Description

Serpentinite rocks are composed of serpentine minerals, which are silicates rich in magnesium and water. The rocks are light to dark green in color, look greasy, and feel slippery. Veins in some rocks appear fibrous and are made of the mineral chrysotile (asbestos). This is a metamorphic rock that forms in the upper mantle or lower part of the ocean crust. Serpentinite is abundant throughout the California Coastal Ranges.

Riprap rock



Close-up



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GRAYWACKE SANDSTONE

Baker Beach exposure



Baker Beach Bluff



Description

Sandstones are coarse-grained sedimentary rocks whose primary component is quartz (silica, crystalline SiO₂). Graywacke sandstone contains a large proportion of light-colored feldspars, volcanic rock fragments, silt, and clay. These components result in a dark gray, brown, or green rock; thus, its other name, “dirty sandstone.”

Graywacke sandstone results from the rapid deposition of material from underwater landslides and currents. The darker layers seen in the photo to the left are shale, finer grained sedimentary rocks more slowly deposited between the landslide events.

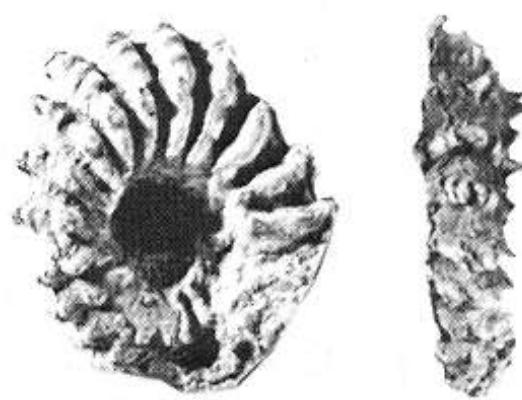
Riprap rock

Sandstone at right, shale at left



Fossil ammonite

From Baker Beach sandstone; approximate size



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GRANITE

Half Dome – Yosemite National Park



Granite Outcrops



Riprap rock



Close-up



Description

Rip rap granites probably come from the Sierra, but also may have come from Monterey or China. Granite is an igneous rock intruded underground with a large proportion of quartz and potassium feldspars (aluminum silicates). Granites have visible crystal grains. Granite has a low percentage of dark iron and magnesium minerals. Small outcroppings of granite also can be found west of the San Andreas fault in northern California.

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ANDESITE and DACITE

Riprap dacite rock



Andesite



Dacite



Locations



The andesite and dacite at the rip rap came from near Santa Rosa, California.

Lassen Volcanic National Park



Description

Andesite is a fine-grained dark colored volcanic rock with a large proportion of quartz and calcium/sodium feldspar minerals (aluminum silicates). It has a larger percentage of dark minerals than granite. (Challenge question: how else are andesite and granite different? How do you know from looking at them?) Dacite is also a fine-grained volcanic rock, but it is lighter colored and contains a higher percentage of quartz. Andesite and dacite volcanic eruptions are the most explosive known.

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RADIOLARIAN CHERT

Folded chert beds, Marin Headlands



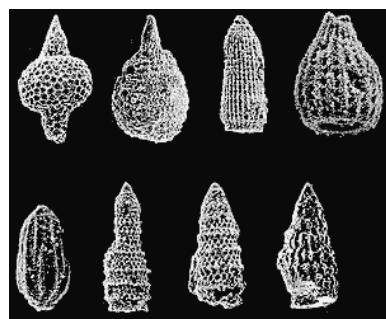
Description

Radiolarian chert is a sedimentary rock rich in silica from the shells of marine protozoa (.5-1.5 mm) called Radiolaria. Local cherts contain tropical radiolarians. These beds form only in the deep ocean where there is little continental mud to dilute the rain of silica shells from dead radiolarians. Both red and green cherts occur in the area; the color reflects the amount of oxygen present at formation.

Riprap rock



Radiolaria



Close-up of beds

